CLAIMS:

What is claimed is:

1. An integrated laser diode system, comprising:

a first waveguide having a first reflector at a first end of the first waveguide and a second reflector at a second end of the first waveguide and an outcoupling aperture positioned to outcouple light at a location between the first reflector and second reflector of the first waveguide;

a second waveguide having a reflector at a first end of the second waveguide, wherein a second end of the second waveguide is optically coupled to the first waveguide;

a third waveguide having a reflector at a first end of the third waveguide, wherein a second end of the third waveguide is optically coupled to the first waveguide;

wherein photons generated in the second and third waveguides are coupled into the first waveguide and emitted through the outcoupling aperture.

2. The integrated laser diode system of Claim 1, wherein the second waveguide has a first electrical contact positioned to apply a voltage across a first region of the second waveguide, and wherein the second waveguide has a second electrical contact positioned to apply a voltage to the second end of the second waveguide.

3. The integrated laser diode system of Claim 2, wherein the third waveguide has a first electrical contact positioned to apply a voltage across a first region of the third waveguide, and wherein the third waveguide has a second electrical contact positioned to apply a voltage to the second end of the third waveguide.

4. The integrated laser diode system of Claim 1, wherein photons are generated in the second waveguide by applying a first voltage to a gain region of the second waveguide, and wherein the degree of coupling of the second waveguide to the first waveguide is controlled by applying a second voltage to the second end of the second waveguide.

5. The integrated laser diode system of Claim 1, wherein the second end of the second waveguide and the second end of the second waveguide are optically coupled to the first waveguide by evanescent coupling.

6. The integrated laser diode system of Claim 1, wherein the first reflector of the first waveguide and the second reflector of the first waveguide are distributed Bragg reflectors.

7. The integrated laser diode system of Claim 1, wherein a grating is positioned between the first waveguide and the second waveguide to facilitate coupling of light from the second waveguide into the first waveguide.

8. A laser diode system, comprising:

a first cavity comprising a first waveguide having a first reflector at a first end of the first waveguide and a second reflector at a second end of the first waveguide, the first cavity having a fist section with an outcoupling aperture;

a second cavity comprising a second waveguide and a third waveguide and the first section of the first cavity, the second waveguide having a third reflector at a first end of the second waveguide, and the third waveguide having a fourth reflector at a first end of the third waveguide; and

wherein the second waveguide is optically connected to the first cavity at a first end of the first section of the first cavity, and wherein the third waveguide is optically connected to the first cavity at a second end of the first section of the first cavity.

9. The laser diode system of Claim 8, wherein light emitted from the first cavity is modulated by varying a voltage applied to a section of the first cavity.

10. The laser diode system of Claim 8, wherein the outcoupling region includes an outcoupling grating; and

wherein the outcoupling grating has a period which is an integer multiple of the wavelength of light generated in the first cavity, but not an integer multiple of the light generated in the second cavity.

11. The laser diode system of Claim 8, wherein the second and third waveguides are optically connected to the first cavity through evanescent coupling.

12. A laser diode system, comprising:

a first cavity comprising a first waveguide;

a second cavity, the second cavity comprising a second waveguide and a third waveguide and a first section of the first waveguide;

wherein the second waveguide is coupled to the first waveguide through evanescent coupling at a first end of the first section of the first waveguide, and the third waveguide is coupled to the first waveguide through evanescent coupling at a second end of the first section of the first waveguide;

wherein photons generated in the first cavity are outcoupled through an outcoupling aperture, the outcoupling aperture being positioned in the first section of the first waveguide; and

wherein photons generated in the second cavity are outcoupled through the outcoupling aperture.

13. The laser diode system of Claim 12, wherein the photons generated in the first cavity are of different wavelength than the photons generated in the second cavity.

14. The laser diode system of Claim 12, wherein the second waveguide has a first contact electrically connected thereto to inject current into a gain region of

the second waveguide, and a second contact electrically connected thereto to vary optical properties of the second waveguide

15. A laser diode system, comprising:

a first cavity optically coupled to a second cavity by evanescent coupling at a coupling region;

wherein the first cavity has a first electrical contact and a second electrical contact; and

wherein the first electrical contact is used to generate photons in an active region of the first cavity, and the second contact is used to vary the optical properties in the coupling region of the first cavity.

16. The laser diode system of Claim 15, wherein the coupling of the first cavity to the second cavity is assisted by a grating.

17. A laser diode system, comprising:

a cavity made from a first waveguide, a second waveguide, and a third waveguide, the first and second waveguides coupled to the third waveguide through evanescent coupling;

wherein the laser diode system outputs at least two different wavelengths of light through a single outcoupling aperture.

18. The laser diode system of Claim 17, wherein the outcoupling grating is located on the third waveguide.

19. The laser diode system of Claim 17, wherein the coupling of the first waveguide and the coupling of the second waveguide to the third waveguide are grating assisted couplings.

20. The laser diode system of Claim 17, wherein the outcoupling aperture comprises an outcoupling grating and a coupling lens which alters the path of at least some of the outcoupled photons.